DOCUMENT RESUME

ED 291 076 CS 009 044

AUTHOR Smith, Brenda D.; And Others
TITLE The Effect of Imagery Instruction on Vocabulary Development. College Reading and Learning Assistance Technical Report No. 87-05.
PUB DATE Apr 87
NOTE 23p.; Paper presented at the Annual Meeting of the Western College Reading and Learning Association (20th, Albuquerque, NM, April 1987).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Higher Education; Instructional Effectiveness; Learning Theories; Long Term Memory; *Mnemonics; *Pictorial Stimuli; *Recall (Psychology); Short Term Memory; Visual Learning; *Vocabulary Development
IDENTIFIERS *Image Theory; *Visual Cues

ABSTRACT

To explore the usefulness of imagery as a learning tool in a classroom situation, this study investigated whether a visual image has an additive effect on the recall of definitions of previously unknown English words. One-hundred-forty-two students enrolled in six sections of an upper level developmental reading course at Georgia State University composed the three groups involved in the experiment to investigate whether providing an image portraying the definition of the word promoted more effective learning than (1) simply providing the definition or (2) providing the definition and a sentence using the term. The first posttest, administered immediately after instruction, showed no significant differences among the three treatment groups, findings that were not unexpected because students were all motivated to study for an upcoming test. However, the delayed test administered two weeks after instruction indicated that the group which received definition, sentence and visual image performed significantly better than the first group receiving only the definition, indicating that visual imagery can be used successfully as part of an instruction technique in vocabulary development programs at the college level. (Two tables of data, one example of the use of imagery, and 20 references are attached.) (NH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED291076

College Reading and Learning Assistance

Technical Report No. 87-05

The Effect of Imagery Instruction on Vocabulary Development

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Norman A. Stahl

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

Brenda D. Smith
Georgia State University

Norman A. Stahl
Northern Illinois University

John Neel
Georgia State University

Paper presented at Western College Reading and Learning Conference in Albuquerque, N.M., April 1987.

CS009044

BEST COPY AVAILABLE

Abstract

Theory and investigations on imagery instruction have been of interest to researchers throughout the twentieth century. More recently, there has been a growing practical interest in the use of imagery as an instructional application in the classroom. This study investigated whether developmental studies students employing an imagery approach to vocabulary development would master a greater number unknown college level words than peers using more traditional approaches. After the students underwent one of the three treatments, all subjects took an immediate and a delayed recognition test over the words under study. Statistical analysis of the data suggests that the experimental treatment is an effective instructional procedure that can be used in the college reading program.

The Effect of Imagery Instruction on Vocabulary Development

Pictures tend to add interest and excitement to learning, but do pictures actually improve memory? In terms of vocabulary development, can an image (a picture portraying definitional clues) enhance a learner's ability to recall a definition of a previously unknown word. Does an image actually add an additional memory trace that is not provided by the definition or by a written sentence suggesting the image. To illustrate with an example from this research, the word augury means omen. Does using the word in a sentence such as "The broken mirror was an unlucky augury of unfortunate events to come" improve a student's retention of the definition? Can the student's memory, both short and long term, be further strengthened by adding to the sentence an actual drawing of a person frightened by his own reflection in a broken mirror?

IMAGERY

The research with imagery instruction has a firm foundation that spans the years. According to Paivio (1971) the earliest experimental studies on the effects of imagery instructions were free recall experiments conducted by Kirkpatrick in 1894. Subjects ranging from the elementary level to the college level were given lists of 10 concrete nouns, both with and without instructions to form mental images of the objects. Recall on this task and two other replication studies was slightly better for subjects receiving imagery instructions. More dramatic results, however, emerged after a three day period

when recall was checked again on the delayed recall the no-imagery group mean was 2.61 as compared to a mean of 4.22 for the imagery group. Kirkpatrick suggested that imagery can serve as an alternative or supplementary memory code to improve recall.

In attempting to replicate Kirkpatrick's study, Rogers (1967) found improved recall for abstract nouns using imagery instructions but not for concrete nouns. Later Gupton and Frinche (1970) found imagery instructions improved recall for high imagery words but not for abstract.

In a somewhat more complex study, Marshall (1965) compared pictures and their concrete noun labels as mediators for abstract noun pairs. For instance, in the task for the noun pair formula and innocence, subjects in the concrete label group were presented with the word baby as a mediator. The imagery subjects, on the other hand, were shown the two words with a drawing of a baby's face as the mediator. Marshall found the picture mediation to be superior to all other combinations. Thus he concluded that for both concrete and abstract noun pairs, recall is enhanced by relevant pictures when the pictures are provided by the experimenter.

After doing much research in the 1960's, Paivio (1971) concluded that human memory is enhanced by mental imagery, and hence he introduced his dual coding theory. The theory describes the verbal and imaginal processes as alternative coding systems. He views the process as two separate cognitive

modes—one a representational system for verbal information and the other for nonverbal (imaginal).

Paivio (1979) described the systems as "independent but richly connected symbolic systems." The image system specializes in perceptual information about objects and events, whereas, the verbal system specializes in dealing with linguistic information. The systems differ further, according to Paivio "in the nature of the representational units, the way the units are organized into higher order structures, and the way the structures can be reorganized or transformed".

Although the dual coding theory has been challenged, Paivio (1986), after examining decades of research, concluded that the "fundamentals of dual coding theory have stood up well to the empirical challenges over the years. Indeed, the supportive evidence is apparently so compelling that some propositional theorists have been motivated to adopt structural and processing assumptions essentially like those of dual coding theory."

Paivio is not the only noted psychologist to support the value of imagery. In a book analyzing the research on imagery and memory, Richardson (1980) concluded, "Experimental research on the value of instruction to subjects to use mental imagery in learning verbal material has generally demonstrated consistent, reliable, and substantial improvements in performance." In addition, he noted, "some results show a somewhat more pronounced effect after a delay." Richardson agreed that imagery can improve memory, and he challenged

researchers to go beyond formal laboratory experiments to explore the potential value of techniques using mental imagery in formal education.

Imagery Mnemonics in Education

Imagery has been used successfully by Atkinson (1975) in his keyword method of learning foreign language vocabulary. In the method the learner first establishes an "acoustic link" by changing the foreign word into a similar sounding English word. Next the learner forms an "imagery link" by visualizing a mental image of the keyword interacting with the English definition. For example, the Spanish word for letter is carta. For the learner, the keyword and thus the acoustic link could be cart, and the mental image could be a shopping cart filled with letters. When compared with other methods of vocabulary development, Atkinson (1975) and other researchers (Pressley 1977; Pressley and Levin, 1978) have shown significantly better results with the imagery keyword method.

Pressley, Levin, and Miller (1981) applied the keyword method to a list of 32 low frequency English words such as cowry, dogger, and catkin. In a series of four experiments with college students, learners using the keyword method out-performed the controls who used personally preferred vocabulary strategies.

Pressley, Levin, and Miller (1982) then conducted research to compare the keyword method with other recommended methods for improving vocabulary. Using the same 32 low frequency English words, six methods of vocabulary learning

were compared, and the researchers found the imagery keyword method to be superior to all methods.

Noting the contrived aspects of Pressley, Levin, and Miller's list of words, Stahl, Brozo, Smith and Henk examined the effectiveness of the keyword method for a list of 150 randomly selected vocabulary words. Four methods of vocabulary development were compared and no significant differences were found. The researchers noted, however, that most students had great difficulty forming images and suggested that the images be provided in future research. In addition, the researchers questioned the random selection of words because some words were easily understood through structural analysis and thus imaging seemed superfluous.

PURPOSE OF RESEARCH

The purpose of this research was to explore the usefulness of imagery as a learning tool in a classroom situation. In teaching students new vocabulary, can the inclusion of a visual image have an additive effect on the recall of definitions of previously unknown English words? This research investigated the following question concerning the retention of the meanings of previously unknown vocabulary words:

> Does providing an image portraying the definition of the word promote more effective learning than simply providing the definition or the definition and a sentence using the term?

Subjects

The subjects were 142 students enrolled in six sections of an upper level developmental reading course at Georgia State University. Two class sections, taught by two different professors composed each of the three experimental groups. Before the treatment began all students were given the Basic Word Vocabulary Test (Dupuy, 1975) in order to have a co-variate.

Materials

Because of concerns over previously mentioned studies, the word list for this study was neither randomly selected nor restricted to a particular concrete noun subset. To create a word list, the researchers turned to The Living Word Vocabulary (Dale & O'Rourke, 1981). The only words considered for the study were those designated at the 13th grade level and listed as unknown to 50% or more of the college freshmen in the Dale & O'Rourke sample. Words that were easily divided by structural analysis into word parts were deleted from the list as were foreign words and technical terms. The list was then given to three college reading professors who each selected 50 items felt to be most useful to college students. From the remaining list, 50, vocabulary words were randomly selected for the study. The words were then randomly ordered so that they would not be presented in alphabetical order. For each item, the researchers used only the definition at the 13th grade level

appearing in The Living Word Vocabulary. The following is a sample of five items from the list:

livid:	enraged
redolent:	fragrant
tumid:	swollen
caravel:	a sailing ship
ostensible:	apparent

In order to confirm that the words in our list were indeed unknown by the majority of our freshman developmental population, the final recognition test using each word was given to another section of upper level developmental college students. The mean score on the test (four alternatives for each item) was 36%. Since chance scores (those obtained by completely random guessing) on the test would have been 25% and any partial knowledge would have raised the chance scores even further, it seemed that our population was indeed unfamiliar with most of the words on the list.

For each of the 50 words the researchers created a sentence and a corresponding drawing. The drawings created by the researchers represented visual interpretations of the sentences. Thus, the same ideas about the word were presented in the sentence and the image, but, according to Paivio, the processing would be in two different modes.

The drawings were not elaborate, in fact, they were quite simple. Previous research on paired-associates (Nelson, Metzler, and Reed, 1974) h

shown no difference in recall when pictures, photographs, or line drawings are used . In addition, researchers (Wood, 1967; Atwood, 1969) have also shown that bizarreness, once thought to be important in images, is not a significant factor in paired-associate learning.

Procedure

At the beginning of each class period, the subjects in the treatment groups were given five words for the day. This procedure was repeated for ten consecutive class periods. Students were asked to keep the words and information in a notebook to be used for later study. Information accompanying the word differed for each treatment as follows:

GROUP 1 Definition Only

Students received only the words and the definitions of the word

Example: augury: omen

GROUP 2 Definition and Sentence

Students received the word with the definition as well as a sentence using the word in a context that would suggest its meaning.

Example: augury: omen

The broken mirror was an unlucky augury of unfortunate events to come.

GROUP 3 Definition, Sentence, and Image

Students received the word with the definition, the sentence using the word in context, as well as an image depicting the ideas in the sentence.

Example: augury: omen

The broken mirror was an unlucky augury of unfortunate events to come.

The image was presented by a transparency on an overhead projector.

PLACE FIGURE ONE ABOUT HERE

At the eleventh class meeting, students were given an announced examination over the 50 words. Each word on the list appeared as a test item and students were asked to recognize the correct definition from four possible choices. The students' vocabulary notebooks were collected at this point to validate that all students followed their respective formats. After a two week delay, students were once again post-tested with the same instrument to evaluate the long term effects of the treatments.

RESULTS

Hypotheses were tested using a one-way multi-variate analysis of co-variance with subsequent univariate analysis of variance with a modified Tukey

comparison technique. Post tests I and II were the dependent variables. The design used three levels of information. Wilks Lambda (.85478) for the multivariate analysis of variance was significant at the .001 level (approximate F = 5.63, DF = 4,276, P < .001). Table I presents the results of univariate analysis on the POST1 and POST2 scores following the multivariate

---

PLACE TABLE ONE ABOUT HERE

---

analysis. Significant differences (P = .037) were found only among the POST2 SCORES. Subsequent comparisons among the POST2 scores using Spjotvoll and Stolines' modification of Tukey's procedure (Kirk, 1982) for unequal sample sizes resulted in differences between group 1 and group 3 only.
Table II presents the means, standard deviations, and sample sizes for the POST1 and POST2 scores.

PLACE TABLE TWO ABOUT HERE

CONCLUSIONS

The first posttest, administered immediately after instruction, showed no significant results among the three treatment groups. This was not an unexpected finding because students were informed of the upcoming test and all groups were equally motivated to study the material.

In POST2, the delayed test administered two weeks after instruction, the means were progressively stronger which each treatment additive. The significant difference that occurred between treatment group 1 and treatment group 3 supports Paivio's dual coding theory. Treatment group 3 which received definition, sentence, and visual image performed significantly better than the first group receiving only the definition. Thus, according to Paivio's theory the visual image did provide an additional memory trace that improved long term memory for the vocabulary items in the study. This finding mirrors research spanning the years as far back as Kirkpatrick in 1894.

The importance of this research to college reading, however, is its application to classroom instruction. The dual coding research has been taken out of the laboratory and into the classroom as suggested by Richardson (1980). This research demonstrates that visual imagery can be used successfully as part of an instruction technique in a vocabulary development program at the college level.

This study and decades of other studies support the importance of imagery in learning. Not only is there a cognitive advantage but as Bower (1972) suggested there is an affective benefit that asks the adult to "become as a child again" and "tap the wellsprings of his suppressed imaginative talents that have lain buried under years of linguistic developments."

References

Atkinson, R. C. (1975). Mnemotechnics in second-language learning. American Psychologist, 104, 126-133.

Atwood, G. E. (1969). Experimental studies of mnemonic visualization. Dissertation Abstracts International, 31, 1556B. (University Microfilms No. 70 - 15, 308)

Bower, G. H. (1972). Mental imagery and associative learning. In Gregg, L. W. (Ed.), Cognition in Learning and Memory. New York: Wiley.

Dale, E. and O'Rourke, J. (1981). The living word vocabulary, Chicago: World Book-Childcraft International, Inc.

Dupuy, H. J. (1975). Basic word vocabulary test. Providence, RI: Jamestown Publishers.

Gupton, T., & Frinche, G. (1986). Imagery, mediational instructions, and noun position in free recall of noun-verb pairs. Journal of Experimental Psychology, 461-462.

Kirk, R. E. (1982) Experimental design (2nd ed.) Monterey, CA: Brooks Cole.

Kirkpatrick, E. A. (1894). An experimental study of memory. Psychological Review, 1, 602-609.

Marshall, G. R. (1965). The effects of concrete noun and picture mediation on paired associate learning of abstract nouns. Paper presented at the meeting of the Eastern Psychological Association, Atlantic City.

Nelson, T.O., Metzler, J., and Reed, D.A. (1974). Role of details in the long-term recognition of pictures and verbal descriptions, Journal of Experimental Psychology, 102, 184-186.

Paivio, A. (1971). Imagery and verbal processes. New York: Holt, Rinehart and Winston, 328-329.

Paivio, A. (1979). The relationship between verbal and perceptual codes. In Carterette, E. C. and Friedman, M. P. (Eds.), Handbook of Perception and Psychophysis, 10, 488-12.

Paivio, A. (1986). Mental representations: A dual coding approach. New York: Oxford University Press.

Pressley, M. (1977). Children's use of the keyword method to learn simple Spanish vocabulary words. Journal of Educational Psychology, 69, 465-472.

Pressley, M. and Levin, J. R. (1978). Developmental constraints associated with children's use of the keyword method of foreign language vocabulary learning. Journal of Experimental Child Psychology, 26, 359-372.

Pressley, M., Levin, J. R., and Miller, G. E. (1981). How does the keyword method effect vocabulary comprehension and usage? Reading Research Quarterly, 16, 214-226.

Pressley, M., Levin, J. R., and Miller, G. E. (1982). The keyword method compared to alternative vocabulary-learning strategies. Contemporary Educational Psychology, 7, 50-60.

Rogers, T. B. (1967) Coding instructions and item concreteness in free recall. Unpublished master's thesis, University of Western Ontario.

Stahl, N., Brozo, W., Smith, B., and Henk, W. Comparing the keyword method to three alternative vocabulary-learning strategies. (Manuscript submitted for publication)

Wood, G. (1967). Mneumonic systems in recall. Journal of Educational Psychology Monographs, 58, (6, Pt. 2).

TABLE I

UNIVARIATE ANALYSES OF VARIANCE AND MEAN SCORES

POST1

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	
A	367.389	2	183.694	2.010	(P = .138)
RESIDUAL	12702.421	139	91.384		
TOTAL	13069.810	141	92.694		

POST2

SOURCE OF VARIATION	SUM OF SQUARES	DF	MEAN SQUARE	F	
A	502.547	2	251.274	3.387	(P = .037)
RESIDUAL	10311.115	139	74.181		
TOTAL	10813.662	141	76.693		

TABLE II

Mean Scores, Standard Deviations and Number of Cases

for POST1 and POST2 Scores by Treatment group

TREATMENT	MEAN	STD DEV	CASES
POST1			
1	40.9333	10.2456	45
2	38.8478	8.5140	46
3	42.7451	9.8201	51
POST2			
1	35.6667	9.4388	45
2	37.2391	7.1311	46
3	40.1569	9.0584	51

FIGURE 1

Group 3 STUDENT NOTEBOOK ENTRY

Definition augury: omen

Sentence The broken mirror was an unlucky augury of unfortunate events to come

Image

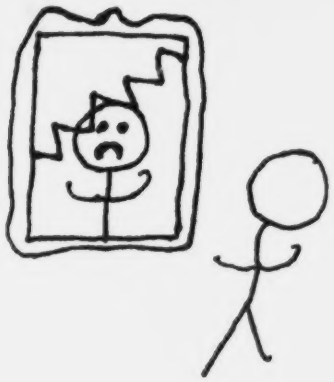

FIGURE 1
STUDENT NOTEBOOK ENTRY

Group 3

Definition augury: omen

Sentence The broken mirror was un unlucky augury of unfortunate events to come.

Image

Master List
College Reading and Learning Assistance Technical Reports

Technical Report No.	
84-01	Brozo, W.B., Schmelzer, R.V., & Spires, N.A. A Study of Test Wiseness Clues in College/University Teacher-Made Tests with Implications for Academic Assistance Centers. (ERIC No. ED 240-928)
84-02	Stahl, N.A., Brozo, W.G., & Henk, W.A. Evaluative Criteria for College Reading-Study Research. (ERIC No. ED 240-933)
84-03	Schmelzer, R.V., Brozo, W.G., & Stahl, N.A. Using a Learning Model to Integrate Study Skills into a Peer-Tutoring Program. (ERIC No. ED 256-244)
84-04	Brozo, W.G. & Stahl, N.A. Focusing on standards: A Checklist for Rating Competencies of College Reading Specialists. (ERIC No. ED 248-762)
84-05	Stahl, N.A., Brozo, W.G., & Gordon, B. The Professional Preparation of College Reading and Study Skills Specialists. (ERIC No. ED 248-761)
84-06	Stahl, N.A. & Brozo, W.G. Vocabulary Instruction in Georgia's Post-secondary Reading Programs. (ERIC No. ED 248-759)
84-07	King, J.R., Stahl, N.A., & Brozo, W.G. Integrating Study Skills and Orientation Courses. (ERIC No. ED 248-760)
84-08	Brozo, W.G. & Schmelzer, R.V. Faculty Perceptions of Student Behaviors: A Comparison of Two Universities. (Not Submitted to ERIC--See the Journal of College Student Personnel, Vol. 26, #3)
84-09	Henk, W.A., Stahl, N.A., & King, J.R. The Readability of State Drivers' Manual. (Not submitted to ERIC--please refer to Transportation Quarterly, 38(4), 507-520).
84-10	Stahl, N.A., Henk, W.A., & King, J.R. Are Drivers' Manuals Right for Reluctant Readers? (ERIC No. ED 245-208)
84-11	Stahl, N.A. & Henk, W.A. Teaching Students to Use Textbook-Study Systems (Not submitted to ERIC--please refer to Reading Horizons, 25 (3), 153-161).
85-01	Stahl, N.A., Hynd, C.R., & Henk, W.A. Avenues for Chronicling and Researching the History of College Reading and Study Skills Instruction. (ERIC No. ED 256-245)

85-02 Smith, B.D. & Elifson, J.M. Do Pictures Make a Difference in College Textbooks? (ERIC No. ED 256-246)

85-03 Brozo, W.G., Stahl, N.A., & Gordon, B. Training Effects of Summarizing, Item Writing, and Knowledge of Sources on Reading Test Performance. (ERIC No. ED 256-247)

85-04 Brozo, W.G. Teaching Students to Recognize and Manipulate Structures of Cohesion. (ERIC No. ED 256-248)

85-05 Henk, W.A. & Stahl, N.A. A Meta-Analysis of the Effect of Notetaking on Learning from Lecture. (ERIC No. ED 258-533)

85-06 King, J.R. & Stahl, N.A. Training and Evaluating Notetaking. (ERIC No. ED 263-537)

85-07 Chase, N.D. Reader Response Techniques for Teaching Secondary and Post-Secondary Reading. (ERIC No. ED 263-535)

85-08 Hynd, C.R. & Alvermann, D.E. The Role of Refutation Text in Overcoming Difficulty with Science Concepts. (ERIC No. ED 264-525)

85-09 Best, P.A. & Brozo, W.G. Current Research on Studying: A Qualitative Analysis. (ERIC No. ED 263-534)

85-10 Stahl, N.A., Henk, W.A., Brozo, W.G., & Sickele, M. Developing Independent Learners: Strategies and Tactics for Mastery of Text. (ERIC No. ED 263-536)

85-11 King, J.R., Stahl, N.A., & Brozo, W.G. Quality Assessments of Prospective Teachers: Surveys of Previous and Present Practices. (ERIC No. ED 266-133)

86-01 Hynd, C.R., Chase, N.D., Stahl, N.A., & Smith, B. Reader Response in the College Developmental Classroom. (ERIC No. ED 270-729)

86-02 Stahl, N.A. & Henk, W.A. Tracing the Roots of Textbook Study Systems: An Extended Historical Perspective. (ERIC No. ED 270-723)

86-03 Brozo, W.G. & Tomlinson, C.M. Literature: The Key to Lively Content Courses. (ERIC No. ED 271-720)

86-04 Brozo, W.G. & Johns, J.L. A Content Analysis of Forty Speed-Reading Books. (ERIC No. ED 270-724)

86-05 Hynd, C.R., Stahl, N.A., & Whitehead, E.H. Computers in the College Reading Program: A Basic Primer. (ERIC No. ED 269-753)

86-06 Singer, M. & Etter-Lewis, G. Personality Type and College Reading Comprehension. (ERIC No. ED 278-967)

86-07 Stahl, N.A., Brozo, W.G., & Simpson, M.L. Developing College Vocabulary: A Content Analysis of Instructional Materials. (ERIC No. ED 278-970)

86-08 Brozo, W.G. & Curtis, C.L. Coping Strategies of Four Successful Learning Disabled College Students: A Case Study Approach. (ERIC No. ED 281-149)

86-09 Stahl, P.C., Stahl, N.A., & Henk, W.A. Historical Roots, Rationales and Applications of Peer and Cross-Age Tutoring: A Basic Primer for Practitioners and Researchers. (ERIC No. ED 284-060)

87-01 Brozo, W.G. & Curtis, C.L. Unskilled College Readers' Comprehension of Connected and Disconnected Text. (ERIC No. ED 281-150)

87-02 Nist, S.L. Teaching Students to Annotate and Underline Text Effectively -- Guidelines and Procedures. (ERIC No. ED 281-155)

87-03 Stahl, N.A., Simpson, M.L., & Brozo, W.G. The Materials of College Reading Instruction: A Critical and Historical Perspective From 50 Years of Content Analysis Research. (ERIC Document Reproduction No. pending)

87-04 Simpson, M.L., Stahl, N.A., & Hayes, C. PORPE: A Comprehensive Study Strategy Utilizing Self-Assigned Writing (ERIC Document Reproduction No. pending)

87-05 Smith, B.D., Stahl, N.A., & Neel, J.H. The effect of Imagery Instruction on Vocabulary Development (ERIC Document Reproduction No. pending)